

- 12 Alexander MA, Johnson EW, Petty J, Stauch D. Mechanical ventilation of patients with late stage Duchenne muscular dystrophy: management in the home. *Arch Phys Med Rehabil* 1979;60:289-92.
- 13 Curran FJ. Night ventilation by body respirators for patients in chronic respiratory failure due to late stage Duchenne muscular dystrophy. *Arch Phys Med Rehabil* 1981;62:270-4.
- 14 Bach JR, O'Brien J, Krotenberg R, Alba AS. Management of end stage respiratory failure in Duchenne muscular dystrophy. *Muscle Nerve* 1987;10:177-82.
- 15 Bach J, Alba A, Pilkington LA, Lee M. Long-term rehabilitation in advanced stage of childhood onset, rapidly progressive muscular dystrophy. *Arch Phys Med Rehabil* 1981;62:328-31.

## RAWP revisited

In the 10 years since the Resource Allocation Working Party (RAWP) devised its formula for equalising the distribution of resources to health authorities in England<sup>1</sup> the gap between the richest and the poorest regions has narrowed. In 1977 there was a difference of 26 percentage points between the most overprovided and the most underprovided regions; today only 11 points separate them (the most overprovided region is 7% above target, the most underprovided 4% below).<sup>2</sup>

In those 10 years few have questioned RAWP's underlying principle—that there should be equal access to health care throughout England. But many have criticised the mechanics of the formula. At present regions are allocated money on the basis of their populations weighted by age and sex and (as a measure of morbidity) by standardised mortality ratios. Adjustments are then made for patients treated from other health authorities (cross boundary flows), for teaching medical students, and for London weighting. The major criticisms have centred on using standardised mortality ratios as a measure of morbidity, the fact that the formula takes no account of social deprivation, and the inadequacies of the payments made for cross boundary flows and for teaching medical students.

Yet the most recent review of the formula, by the NHS Management Board, has reaffirmed the soundness of the formula nationally while conceding problems in implementing it within regions, where the board has recommended a less mechanistic interpretation.<sup>2</sup> In its interim report, published last year, the board suggested some minor adjustments to the formula, but its definitive report has been delayed to the end of this year because the board wanted more research and analysis done. In particular, it wants more research into measures of morbidity and social deprivation, the costs of teaching districts, and the inclusion of outpatient and accident cases in cross boundary flows.

That more research is still needed is also one of the messages of the series on RAWP by Gwyn Bevan and his colleagues at St Thomas's Hospital that we have published over the past few weeks (p 1039). Bevan cites the allowance for teaching medical students (the service increment for teaching, SIFT) as an example of RAWP's boldness of purpose producing "something designed to be immediately acceptable but which the succeeding decade has failed to improve on." In other words, the original working party was flying by the seat of its pants, and Bevan argues that today we still do not know whether the calculation for compensating teaching hospitals for the extra cost of medical students is generous or not (he thinks it probably is generous).<sup>3</sup> Meanwhile, the NHS Management Board fears that there may be an underlying conflict between teaching and service needs and wants it resolved.

Even when adequate data are available the implications are often uncomfortable. In the middle paper of their series Bevan and Brazier argue that, contrary to popular wisdom, problems in RAWP losing districts where there are heavy inflows of patients (generally teaching districts) are caused not by inadequate compensation for these cases in the formula but by "overuse" of services by a district's own residents and by the fact that authorities cannot control their residents' use of services because they cannot prevent them from going to neighbouring districts.<sup>4</sup>

This problem and that of the conflict between teaching and service needs both come to a head in inner city teaching districts, particularly in London. Yet these districts have not deliberately failed to grasp the nettle proffered them by RAWP. Indeed, as the King's Fund study showed for London<sup>5</sup> and as Langman's report showed for Birmingham,<sup>6</sup> they have greatly reduced their numbers of beds. But their workload (and hence their spending) has not declined proportionally—presumably because there are still enough doctors to do the work. Thus does supply continue to subvert the definition of need. The *Economist* has been the most recent to argue that it is no good simply redistributing cash—doctors and hospitals have to be moved as well.<sup>7</sup> Two weeks ago Bloomsbury Health Authority announced a plan for demolishing the Middlesex and University College Hospitals and centralising their services in a new medical and teaching centre.<sup>8</sup> Perhaps they should go a stage further and build it in the north of England—where the morbidity is.

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- 1 Resource Allocation Working Party. *Sharing resources for health in England*. London: HMSO, 1976.
- 2 NHS Management Board. *Review of the resource allocation working party formula*. London: DHSS, 1986:5.
- 3 Bevan G. Is the medical service increment for teaching (SIFT) adequate? *Br Med J* 1987;295:989-91.
- 4 Bevan G, Brazier J. Financial incentives of subregional RAWP. *Br Med J* 1987;295:836-8.
- 5 King Edward's Hospital Fund for London. *Planned health services for inner London. Back to back planning*. London: King Edward's Hospital Fund for London, 1987.
- 6 Langman MJS. Efficiency savings or financial cuts: some morals from Birmingham. *Br Med J* 1987;295:902-3.
- 7 Anonymous. Dying of inequality. *Economist* 1987 April 4:10:26.
- 8 Hall C. 900-Bed hospital proposed for central London. *Independent* 1987 Oct 9:2 (col 1).

## The sauna: killer or healer?

Sudden deaths have occurred in saunas, raising worries that they may be dangerous. But at the same time they are proliferating in sports centres and "health clubs," with claims being made that they are beneficial to health. The time is clearly ripe to examine the effect of the sauna on health, and two Finnish doctors have done just that, compiling a review with 104 references.<sup>1</sup>

The first problem that the reviewers met was to define a sauna. There are many variations from the Finnish prototype, which is in a small log cabin beside a lake. Inside the hut water is ladled on to stones covering a wood fire to create in the cabin a high temperature and to control the humidity. After a spell in the hut the person taking the sauna plunges into the cold lake; he or she then has the circulation restored by being beaten with birch twigs. The Sauna Society of Finland recommends that the temperature at the level of the face should be 80-90°C and the humidity 50-60 g of water vapour for each cubic metre. The stay in the hot room is normally limited to about 10 minutes at a time, and three

exposures to the hot room are usual. In various reports, however, the temperature has varied from 43°C to 120°C and the humidity from 3% to 50%, and people have spent anything up to several hours in the sauna.

Much of the research that has been done on the sauna has looked at physiological responses. In the heat the pulse rate increases to 100-160 beats a minute, cutaneous blood vessels dilate, and cardiac output increases; the diastolic blood pressure usually falls, but the systolic pressure may rise or fall depending on how much cardiac output compensates for decreased peripheral resistance. These changes are the same as occur in exercise, and the seated sauna bather may reap some of exercise's advantages without moving. The cold reverses the effects of the heat and raises the systolic blood pressure, sometimes considerably. During a sauna at least 0.5 kg of sweat may be lost, men sweating more than women, which means that women tend to spend less time in the sauna. The sauna has, indeed, been used to investigate how dehydration, electrolyte loss, and the increased osmolarity of body fluids increase the secretion of vasopressin, renin, and aldosterone. The secretion of other hormones has also been investigated, and one finding was a greatly raised prolactin release in women.<sup>2</sup> This might explain the transient amenorrhoea seen in some women after saunas. The slight rise in platelet counts and the shorter clotting time seen in sauna bathers are compensated for by accelerated blood flow and faster fibrinolysis. No conclusive changes in the immune system have been shown.

The occurrence of sudden deaths prompted electrocardiographic studies on what happens in the sauna to both the healthy and those who have had heart attacks.<sup>3,4</sup> Ectopic beats and ST segment displacements were seen, but they usually occurred in those unaccustomed to saunas (and so may have been caused by anxiety or exercise) and in those who stayed in the hot room for 20 minutes or longer until they suffered discomfort.<sup>4</sup> A study conducted on Finns concluded, however, that the sauna does not cause dangerous arrhythmias, even in those with heart disease, so long as

exposure is reasonable and cooling off moderate.<sup>5</sup> Epidemiological evidence which assumes that Finns visit a sauna once weekly for an hour shows that there is no significant increase in heart attacks either in the sauna or soon afterwards.

Nevertheless, novices, the elderly, and those with heart disease should be advised to adopt a gentle approach to saunas, spending only five minutes in the hot room at first. A sauna is not advisable in those ill with fever, those who are dehydrated, those who have recently taken alcohol or strenuous exercise, and those who have anhidrosis. A sauna is safe in pregnancy as fetal abnormalities do not occur despite hyperthermia being a teratogen in animals.<sup>6</sup> Spending too long in the hot room is dangerous, and one young man developed renal failure after spending five hours in the sauna in a futile attempt to lose weight.<sup>7</sup>

The sauna has no proved benefit in promoting fitness or preventing illness, but aches or pains are relieved and stiff joints loosened. Many enjoy saunas because they produce tranquility and a sense of well being, sensations that may be caused by a rise in endorphins in response to hyperthermia.<sup>8</sup> A long hot bath might be just as effective, but the heat is greater in a sauna and habitués like the social aspect of saunas, which are difficult to emulate in a bath.

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- 1 Kauppinen K, Vuori I. Man in the sauna. *Ann Clin Res* 1986;18:173-85.
- 2 Leppaluoto J, Huttunen P, Hirvonen J, Vaananen A, Tuominen M, Vuori J. Endocrine effects of repeated sauna bathing. *Acta Physiol Scand* 1986;128:467-70.
- 3 Taggart P, Parkinson P, Carruthers M. Cardiac responses to thermal, physical, and emotional stress. *Br Med J* 1972;iii:71-6.
- 4 Sohar E, Shoenfeld Y, Shapiro Y, Ohry A, Cabili S. Effects of exposure to Finnish sauna. *Isr J Med Sci* 1976;12:1275-82.
- 5 Luurila OJ. Cardiac arrhythmias, sudden death and the Finnish sauna bath. *Adv Cardiol* 1978;25:73-81.
- 6 Anonymous. Is hyperthermia a teratogen? [Editorial]. *Br Med J* 1978;ii:1586-7.
- 7 Dean S, Green DJ, Melnick SC. Hazards of the sauna. *Br Med J* 1977;i:1449.
- 8 Ježova D, Vígás M, Tatar P, Jurčovičová J, Palát M. Rise in plasma  $\beta$ -endorphin and ACTH in response to hyperthermia in sauna. *Horm Metab Res* 1985;17:693-4.